GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

RESEARCH PROJECT INITIATION

Date: November 20, 1975

Project Title: Technical Evaluation of the Materials and Stitching System...

Project No: E-27-633 (Continuation of E-27-628)

Principal Investigator Dr. W. D. Freeston

Sponsor: US Army Natick Development Center

Agreement Period: From 11/10/75 Until 1/9/76

Type Agreement: Purchase Order No. DAAG17-75-M-1033 Fixed Price

Amount: $1,500

Reports Required: Final Report

Sponsor Contact Person (s):

Procurement Office
U.S. Army Natick Development Center
Kansas Street
Natick, Massachusetts 01760

ATTN: AMXNM-PB

Assigned to: Textile Engineering

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Director, Financial Affairs (2)	
Security-Reports-Property Office ✓	
Patent Coordinator	Other

RA-3 (9-75)

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

Post-it 605

Date: May 4, 1976

Project Title: "Technical Evaluation of the Materials and Stitching System"

Project No: E-27-633

Project Director: Dr. W. D. Freeston

Sponsor: U. S. Army Natick Development Center

Fixed Price Purchase Order - Attached to E-27-628 - test testing project. - No Prop. certs. required - ath.

Effective Termination Date: 1/9/76

Clearance of Accounting Charges: 1/31/76

Grant/Contract Closeout Actions Remaining: NONE

_ Final Invoice and Closing Documents
_ Final Fiscal Report
_ Final Report of Inventions
_ Govt. Property Inventory & Related Certificate
_ Classified Material Certificate
_ Other _____

Assigned to: Textile Engineering (School/Laboratory)

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CA—4 (3/76)

FINAL REPORT

Technical Evaluation of Materials and Stitching System
(contract No. DAAG-17-76-M-1088)

Prepared for

U. S. Army Natick Laboratories
Natick, Mass.

by

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School of Textile Engineering
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March, 1975

Technical Evaluation of Materials and Stitching System

This investigation carried out for U.S. Army Natick Development Center examined for tensile strength and web fabric needle damage six samples in which web material, skin material and seam type were varied. Description of the samples tested follows:

Sample Section No.	Web Material	Skin Material	Seam Type
1.)	Single Coat	Type I Class 1	Straight Stitch
2.)	Single Coat	Type I Class 2	Straight Stitch
3.)	Double Coat	Type I Class 1	Straight Stitch
4.)	Double Coat	Type I Class 2	Straight Stitch
5.)	Single Coat	Type I Class 1	Double Stitch
6.)	Single Coat	Type I Class 2	Double Stitch

All samples were sewn by Natick on a double needle, 3/16" gauge machine using Singer needle no. 4401 - size no. 23. The seams were sewn at 6 ($\pm$1) stitches per inch.

Three specimens of each were subjected to five cycles of preloading at 85 lbs. deadweight using a period of two hours under load and 1/2 hour relaxation per cycle. These three specimens and four additional specimens which had no preloading were tensile tested to failure. The stitches were removed from a six inch specimen of each sample material for a visual needle damage inspection of the warp and filling threads of the web material.

Results from these tests are as follows:

Sample Section No.	AVERAGE ULTIMATE TENSILE STRENGTH (lbs/in.width)		NEEDLE DAMAGE (No. of cut yarns/stitch)	
	No Preload	After 5 cycle preload	Warp	Filling
1	130	134	0.20	0.23
2	118	124	0.21	0.19
3	132	140	0.24	0.27
4	122	129	0.43	0.57
5	116	114	0.15	0.18
6	118	130	0.11	0.19

Some observations based upon these data include:

1.) All tensile failure load levels exceed the 3 psi over-pressure load level by 400%.

2.) The effect of cyclic preloading generally is to increase the tensile strength of specimens.

3.) The needle used cut less than one warp of filling yarn per seam stitch. At these very low levels of web fabric yarn damage due to sewing, tensile strength of the specimens is not relatable to needle caused yarn damage.

4.) The effect of web or skin material and double stitching produced no significant trends in the data. Comparison of data in which web material, skin material or seam type were grouped produced 7% or less change.